

Software at AMD

AMD Developer Outreach

May 10, 2006

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x86 Everywhere: AMD's Technology Vision

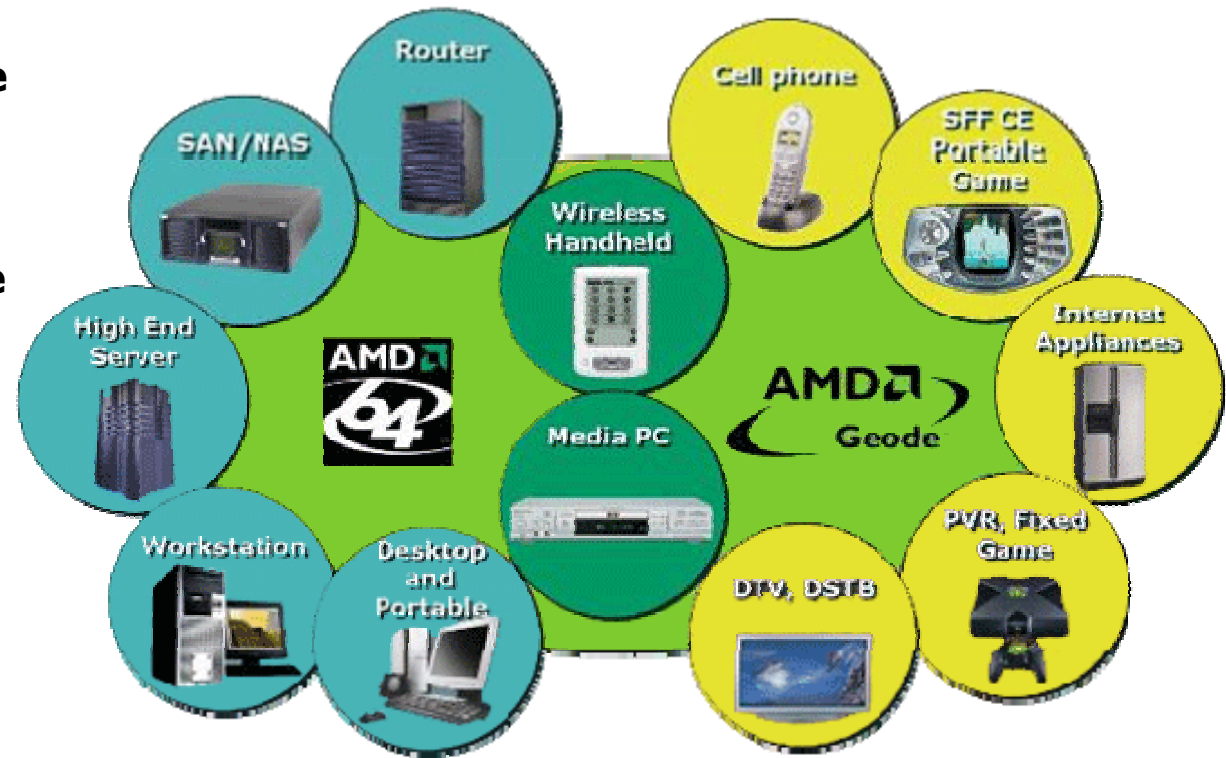
AMD is extending x86 to a growing list of new solutions and form factors.

Expands AMD's addressable markets and increases revenue opportunities

Advances the x86 ISA as a universal platform architecture

Creates increased economic opportunities for customers

- Gives OEMs a way to increase end-product differentiation and speed time to market using x86 software and AMD processor-powered solutions
- Drives demand through an improved digital lifestyle experience, increased product interoperability, connectivity and functionality



Leading the Industry to Pervasive 64-Bit, Multi-Core Computing



Welcome to the



World of AMD64

The ranks are growing. **Who's next?**

**Adopted by more than
2,000 manufacturers
and partners worldwide**



Discussion Topics

- Software Development at AMD
- Open Source
- Emerging Firmware Technologies
- Developer Outreach

Software Development at AMD



Software at AMD

- Inbound Software Development
 - Focus on checkout of AMD microprocessor features and platform technologies
 - Software that is essential to the validation and bring-up of new AMD microprocessors and platforms
 - Development on new platform technologies
- Outbound Software Development
 - Focus on performance tuning and analysis for AMD products
 - Support of ISVs to optimize their products for AMD microprocessor technologies
 - Development with major ISVs and OSVs to ensure proper compiler support

Inbound Software Development

- BIOS/Firmware
 - Simulation techniques utilized to facilitate early checkout of BIOS
 - Development of AMD microprocessor specific components for deployment to AMD's partners and customers
- Diagnostics
 - Leverage internal silicon verification tools to facilitate initial silicon bring up
 - Microsoft and Linux stress tools
- Tools
 - "Checker" tools developed and deployed to AMD's partners and customers to allow for easy AMD platform development and checkout
 - Hardware debug tools for platform and code development
 - Performance analysis tools to support AMD's silicon teams and external ISVs
 - Thin hypervisors to enable checkout and enablement AMD's virtualization technology
- Infrastructure Enablement
 - Development of all inbound software directly drives and has a positive effect on the enabling of BIOS Vendors, ISVs, ODMs, etc.

Outbound Software Development

- Compiler Optimization
 - Working with major compiler developers to ensure that optimized code can be generated to support AMD's microprocessors
- Performance Analysis
 - Analyze
- Performance Library Development
 - AMD performance libraries to support compute intensive applications
- Codec optimizations

Open Source



AMD's Participation in Open Source

- **Linux Kernel**
 - AMD partners with the major Linux developers to ensure that AMD technology is supported in the Linux kernel
 - Building large dedicated kernel development team
- **Linux Tool Chain**
 - Dedicated team for Linux tool chain to optimize compilers (gcc)
 - Work with community on development environments (eclipse), debuggers (gdb), etc
- **Virtualization**
 - AMD participates in the open hypervisor development in the XenSource community.
 - AMD has dedicated engineers contributing to the Xen codebase to support AMD virtualization technology. Developed and donated native SVM support to community. (Xen 3.02)
- **Linux CodeAnalyst™ Performance Analyzer**
 - Distributed in source form at developer.amd.com
 - Participate in Oprofile open source SourceForge community project
- **LinuxBIOS**
 - AMD supports the LinuxBIOS initiative by enabling AMD microprocessor specific modules and technology

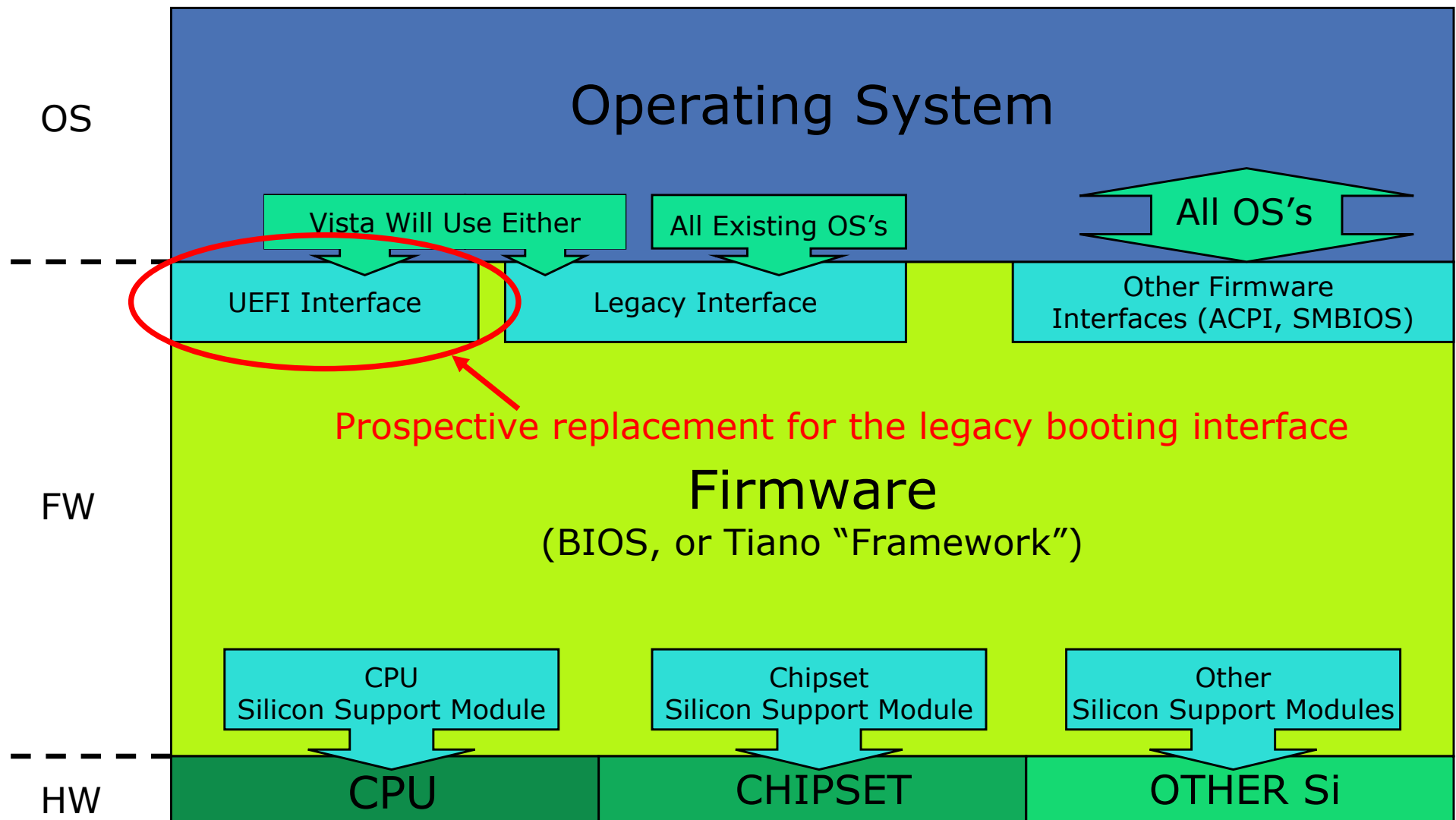
Emerging Firmware Technologies



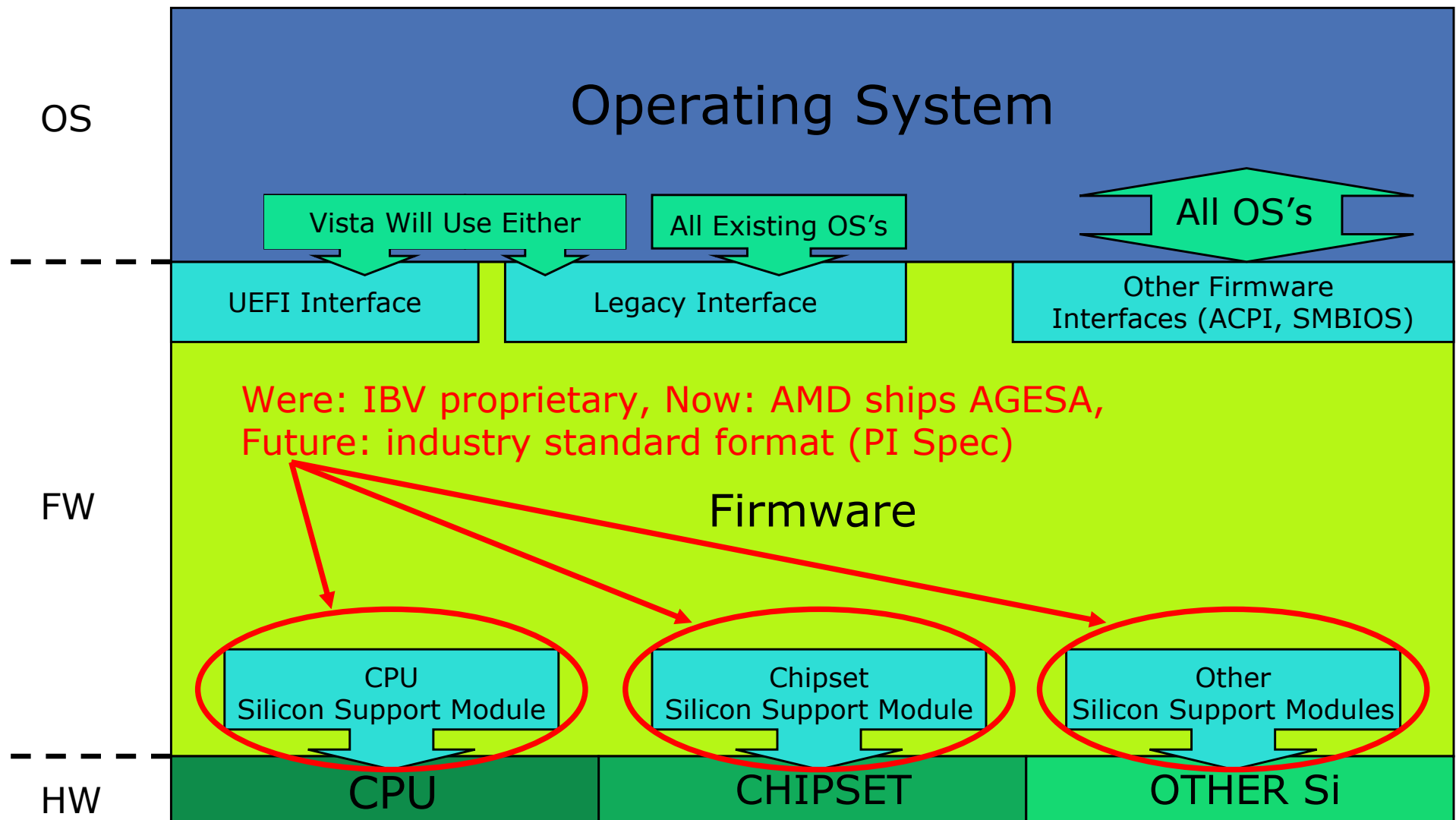
Problems with Firmware Interfaces

- **There are 2 main problems:**
- 1) The top-side interface to the OS
 - i.e. Firmware's connection to Software*
 - Undocumented, untestable and limited to Real Mode
 - Eventual solution: **UEFI**
- 2) The bottom-side interface to silicon
 - i.e. Firmware's connection to Hardware*
 - Each BIOS brand has a different “socket” for silicon-support modules; mutually incompatible
 - Eventual solution: **PI (Platform Initialization) Spec**

Firmware Block Diagram



Firmware Block Diagram (Problem 2)



UEFI and PI

- UEFI
 - Industry-specified replacement for the BIOS's legacy (Real Mode) booting interface
 - Open follow-on to Intel's unilateral EFI spec
 - AMD supports UEFI and participates actively on The UEFI Forum's Board and in its Work Groups
 - This will be a paced transition
 - UEFI will be supported by Vista but not preferred over legacy booting
 - AMD expects the transition to take five years or more
 - AMD is continuing to support legacy solutions as well
 - Customers and the market can decide when the transition happens*
- PI (aka "FFSA")
 - new firmware-to-silicon interface
 - An open, industry-specified follow-on to Intel's PEI/DXE specs
 - The PI Goal: portable, silicon-support modules that can plug into all industry firmware implementations
 - AMD is active in the PIWG; working to define the PI Spec
 - Until PI supports non-Intel silicon architectures, AMD will continue to support customers using its AGESA modules
 - AGESA currently provides a common, portable CPU module
 - AMD customer support organizations will continue to support legacy BIOS customers during the (relatively long) transition to PI and UEFI

AMD Developer Outreach



Software Development: The Future



64-bit Computing

Server, Workstation, Desktop, Mobile

More Cores

2, 4, beyond

New Memory Support

DDR2, DDR3

Faster Input/Output

HyperTransport 3, PCI Express Gen 2

Better Power Management

Split power planes allow CPU core voltage to be reduced, while NB services probes, memory requests

Security, Virtualization, Management

Developers

11 million professional developers worldwide:*

- 5.3M (48%) develop with Java*
- 4.7M (43%) develop with .NET*
- 7.7M (70%) use Visual Studio as their primary IDE
- 3.85M (35%) are currently building applications on the Linux platform (60% CAGR)
- ~94,000 developers attended the top developer events last year
 - LinuxWorld – 14,000, PDC – 12,000, TechEd – 11,000, JavaOne 15,000, Oreily - 2,400, OOW - 40,000
- Influence:
 - Data center requirements are appearing early in development
 - Development platform is very likely a preferred deploy platform
 - Self-report that they impact systems purchase decisions

•*DevX #2 developer site behind MSDN



Test Your Knowledge

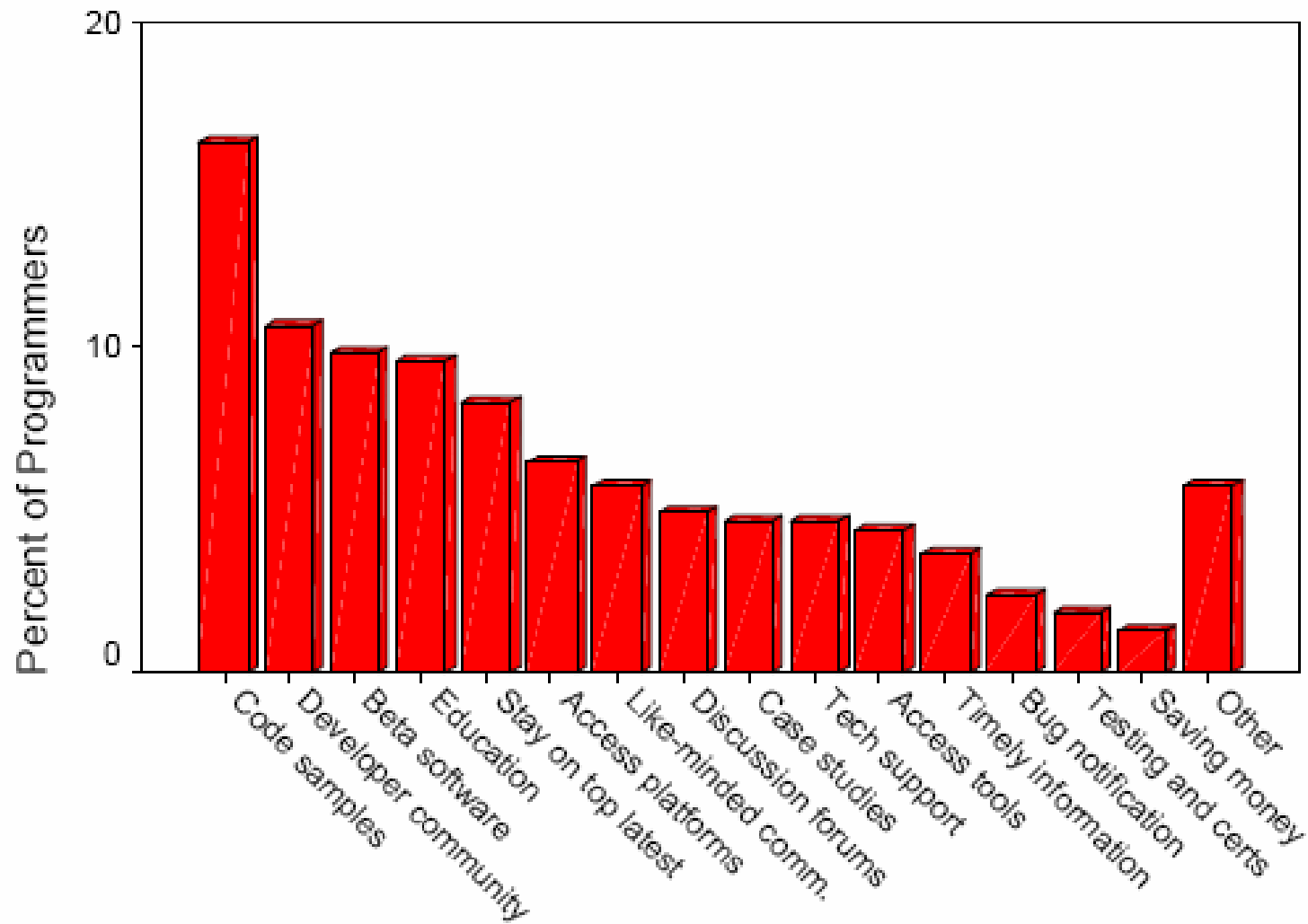
- What is the average age of developers?* What percent are female?
 - **41, married. 4% are female.**
- What percentage have 10+ years of development experience?
 - **59%**
- What percent are in-house developers?
 - **18%. Commercial 26%, VAR/SI 28%, Corp Apps for Ind. 11%, OEM 7%, Scientific 5%, Other 6%**
- How many visited AMD Dev Central last year? developer.amd.com
 - **300,000**
- Which topic/interest brought them there?
 - **Optimization**
- What is the most credible source for information on emerging technologies?*
- **Another developer. 46% say that online communities and peer resources are the SINGLE most credible source of information.**
- What percent report they are self taught?*
- **43%**

*Evans Data Developer Marketing Patterns, 2005 Report



Supporting Developers

Most Important Benefit of a Developer Program



Developer Relations Programs 2005, © 2005 Evans Data Corp

Top Developer Issues

Topline Issues for AMD's Developers			
	Currently Facing	Expect to Be Facing in Next 12 Months	Not An Issue
(BASE: Total Sample)	(319)	(319)	(319)
	%	%	%
Optimization	66	25	9
64-bit computing	53	34	14
Multi-core / multithreading	46	43	12
Access to tools / Compilers	40	19	40
Managed Code	22	18	59
Virtualization	12	30	58

"Most Important" Issues Facing Developers in Next 12 Months OPEN ENDED QUESTION

	Total Sample
	(319)
	%
1. 64 Bit Related	28
2. Specific Software / Application / Program Issues	16
3. Efficiency	12
4. Multi-core / Multi-threading issues	12
5. Development Issues	9
6. Performance / Reliability	8
7. Human Concerns	6
8. Support / Documentation	4
9. Money / finance issues	3

Developer Resources

- Documentation
- Developer Tools
- Discount Hardware
- AMD Developer Center
- AMD Tools
- Training & Education

Developer Community

- Developer Spotlight & Case Studies
- Developer Toy Box
- Developer Forums
- Events Schedule

AMD Info

- Product Information
- AMD64 Software Ecosystem
- AMD64 Device Driver Support
- System Component



Welcome to AMD Dev Central

The new AMD Developer Program is a resource designed specifically to meet the needs of our expanding developer community. AMD provides the innovation. You provide the imagination, and AMD Dev Central provides the tools to help you create infinite possibilities.

- ▶ [Program Benefits](#)
- ▶ [Self-Guided Tour](#)

Latest Resources

RSS

- ▶ [Give your applications the freedom to grow by downloading DB2 Express-C today! With a no-risk, no-fee entry point, DB2 Express-C is](#)



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developer.amd.com

Objective: Winning Hearts and Minds

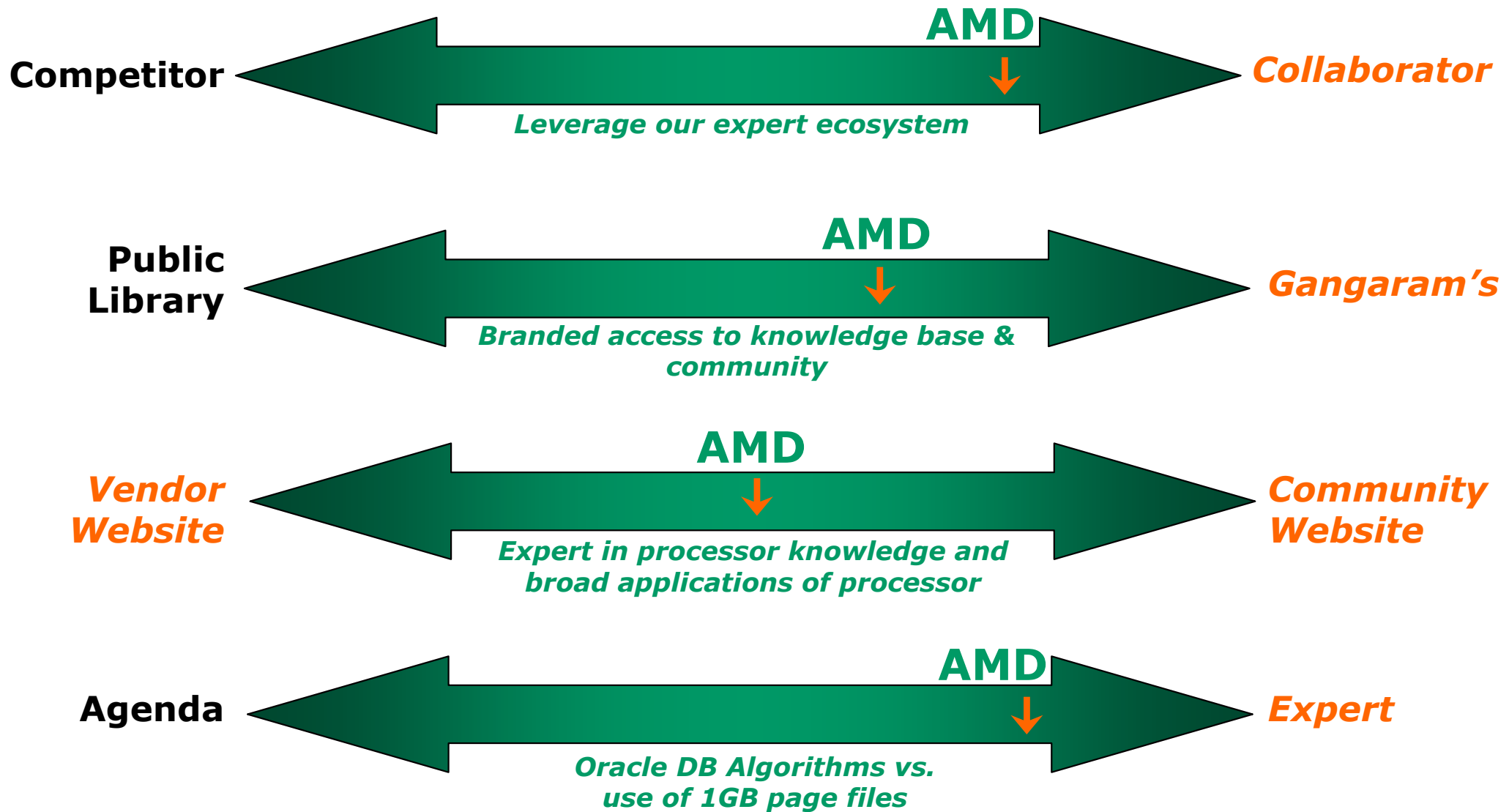
A thriving community of hundreds of thousands of *successful* developers supported by AMD and each other with the result that:

- Developers, and lots of them, become our strongest/best advocates.
- Developers come to AMD first to learn about x86 architecture, development, and futures because it helps them do their job better, do great things, and be smart.
- Developers want to develop and deploy on AMD because it's easy, it just works, and they have great support.
- Developers know "how to do it" on AMD64 - optimize, fix problems, find the right resources for their products, overall solutions, and personal productivity.
- Developers advocate and articulate to peers, management, and their communities the clear benefits and advantages of AMD64 and a (24 month?) AMD vision of leadership.

What AMD has to say...

- **Developing Performance:** 64 bit, Multi, Tools, Optimization
- **Systems and Solutions:** Standards, Platform and system management, SLI, 50 x 15, Reference platforms, Digital Life, OPMA
- **Compilers and Tools for AMD Processors:** PGI Tools, Microsoft Tools, CodeAnalyst/Profiling Tools, GCC and GNU/Open Source Tools, What to use when you can't avoid Intel Compiler, ACML and maybe APL ...
- **PGI Compiler Tools Lab**
- **OS:** Linux, Windows, Solaris, Virtualization
- **Open Source and Open Standards**
- **Interoperability and Security:** Security, Networking
- **BIOS/Firmware/Device Drivers/Chipsets**
- **Processor and System Architecture:** Process technology, F,G, GH, futures
- **Embedded**
- **Futures:** The future of AMD multi-core and systems, AMD Server Futures and Vision (Mention Scalable Server Up and Out)
- **Software Optimization for AMD DeerHound/GreyHound:** DH/GH Architecture review, Uni-core(Scalar) DH/GH Code Optimization Techniques, Multi-core Programming and Optimization, Compilers, Tools, and Profiling for DH/GH, A Dummy's Guide to all of AMD's Developer Documents and Sites.
- **Deploying/Developing for Microsoft Compute Cluster Edition and Vista on AMD64:** Setting up an AMD64 Cluster with real examples and hardware, Compiling / Developing for CCE, Tuning for , AMD Optimizations for Vista, Developing 64-bit WDM/WDF/LDDM drivers for AMD64
- **Open Solaris and Sun Studio Tools for AMD64:** OS overview, DTRACE on AMD64, Fault Management on AMD64, Sun Studio for Solaris and Linux, Open Solaris Process and Community
- **Linux Kernel and Tools for AMD64:** Power-Management Drivers and Tools on AMD Processors, RAS and Machine Check Diagnostics Tools on AMD64, Upcoming Kernel support for new AMD Features, Repeat or expanded GCC session
- **Virtualization:** Pacifica Overview, Presidio and IOMMU Overview, Microsoft Virtual Server on AMD64, Xen on RH/SLES on AMD64, TPMs: what are they, why do we care?
- **BIOS and Manageability Strategy:** Traditional BIOS and AGESA Overview, LinuxBIOS Overview, UEFI update, OPMA et al
- **JAVA, CLR, and Other Interpretative Languages on AMD**

What to expect from AMD



AMD Developer Outreach Program

**Developer
Central**

**AMD
Developer
Events**

**Dev
Events**
LinuxWorld
GDC
JavaOne

**Partners
Community**
MS, Oracle,
RedHat, BEA,
IBM, Sun, HP

Industry
TopCoder, DevX
Slashdot,
publications, etc.

	24x7x365	1-2 Days	Quarterly Schedule	Programs	Strategic
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OBJECTIVES

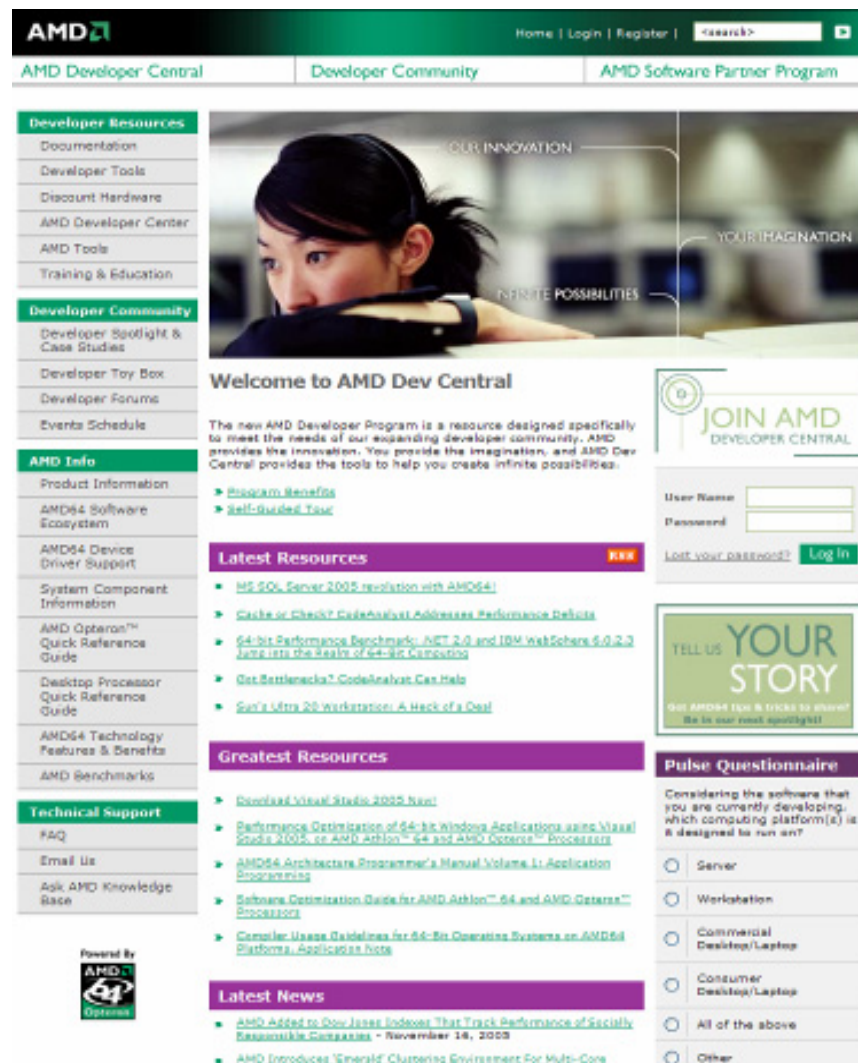
- Developers become our best advocates, and come to AMD first to learn about x86.
- Developers want to develop and deploy on AMD, and are assured of the longevity of the AMD ecosystem.
- Developers know "how to get it done" on AMD64, and evangelize AMD to peers, management, and their communities

- 80% Developers want to work with AMD processors
- 87% think AMD is Innovative
- 89% trust the AMD brand
- 86% are satisfied with AMD

AMD Dev Central

Join now for access to:

- AMD Developer Tools
 - AMD Core Math Library
 - AMD CodeAnalyst™ Profiler
 - AMD SimNow™ Simulator
- Discount Hardware Program
 - Custom order development systems at a 15% discount
- Technical Documentation
 - How-to's, manuals, tutorials, etc.
- Developer ToyBox
 - Links to fun games and downloads
- Developer Spotlight
 - A section to feature you and your work!
- Developer Forums
 - Learn from your peers
- Developer support via email



<http://developer.amd.com>



AMD on DevX : *An excellent technical resource!*

Features articles such as:

- Athlon 64vs. Opteron Processors: What's the difference again?
- Got Bottlenecks? CodeAnalyst Can Help
- Sun's Ultra 20 Workstation: A Heck of a Deal
- WOWing Your 32-bit Applications with 64-bit Windows, Part I
- C/C++ Compiler Switches for Fast, Portable 64-bit Code



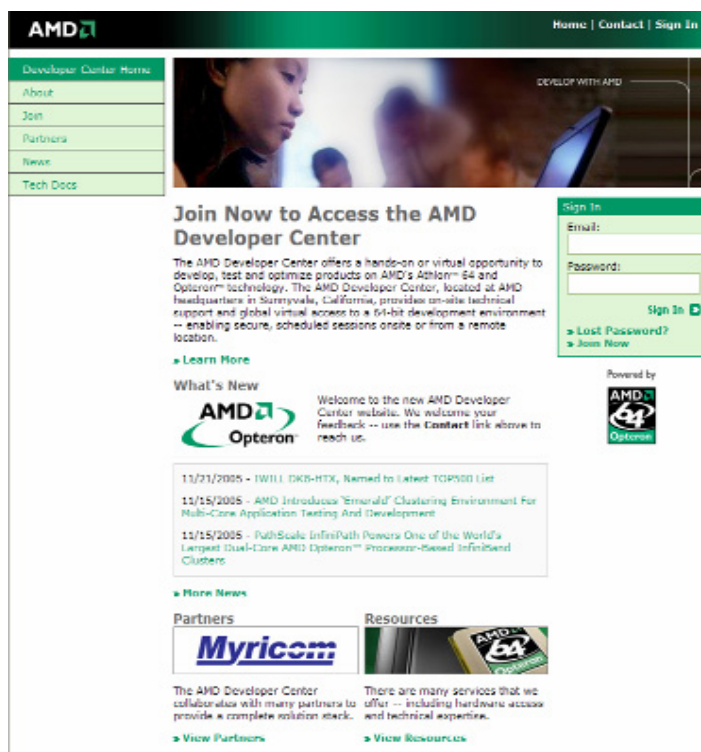
<http://www.devx.com/amd>



AMD Developer Center

Get remote access to:

- AMD64 software porting and testing
- 32-bit application compatibility testing with 64-bit OS
- Benchmarking of AMD processor-based systems, enterprise configurations and HPC clusters
- Code optimization for Athlon™ 64 and Opteron™ processors



<https://devcenter.amd.com/>

AMD and You: Champions of your Performance

- Register for AMD Developer Central.
- See what we have to say about x86 development that will Champion Your Performance.
- Visit DevX and learn.
- Tell us what is on your mind in the Forums!
- Talk to your community; they are developing and deploying on AMD.

